Cluster Magnification

& Comparison to Shear Mass Measurements

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Summary: we measured stacked cluster masses using magnification, then shear, and compared the results. Masses are mostly within 1-2σ, but trends suggest a z-dependant systematic bias.

Magnification Bias

Observed number densities of background sources are altered by the presence of a massive foreground lens.

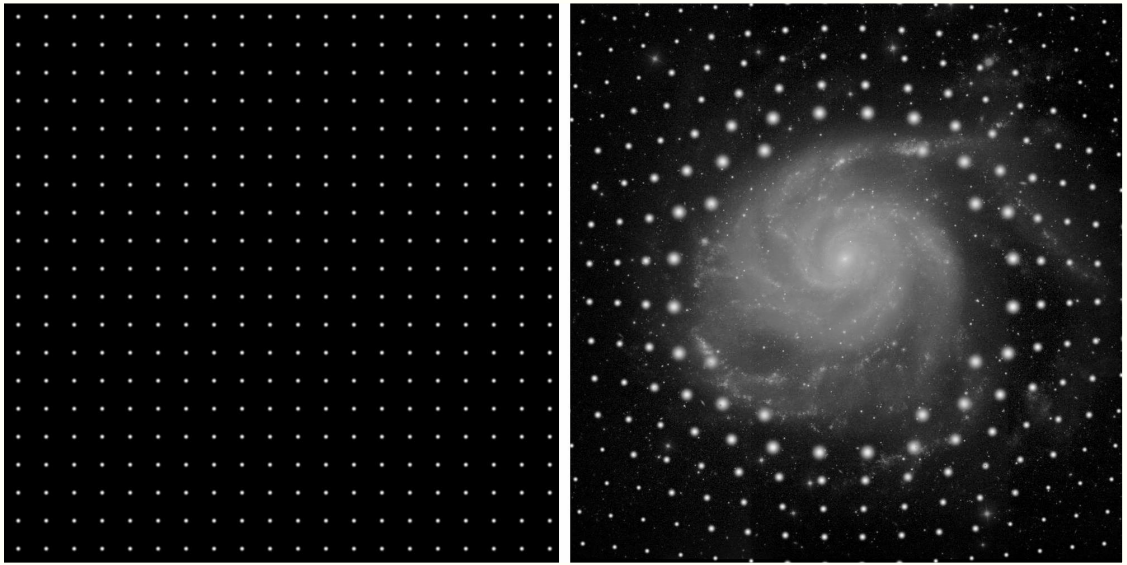
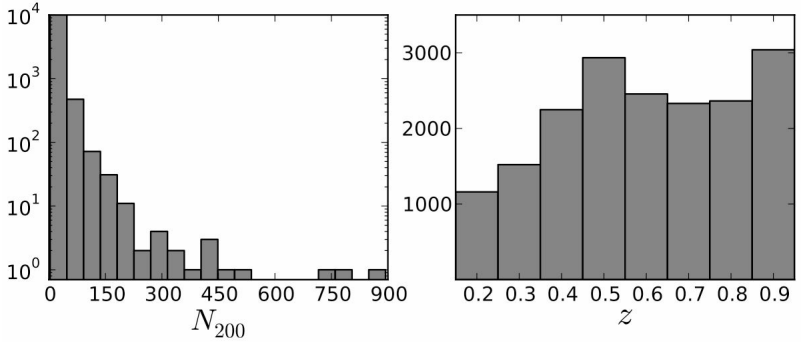


Image: SDSS

- can use unresolved sources
- “easier” than measuring shapes
- higher-z than possible for shear
- different systematic biases than shear

Cluster Lenses

>18,000 cluster candidates over 154 deg^2 of CFHTLenS



- Redshifts up to $z \sim 1$
- Richness N_{200} mass proxy
- 3D-Matched-Filter cluster finder (Milkeraitis+ 2010)

Sources

Completely different sources for magnification than shear

- **Magnification:** ~120,000 Lyman-break galaxies (*u*-dropouts) at $z \sim 3$

  (Ford+ 2014)

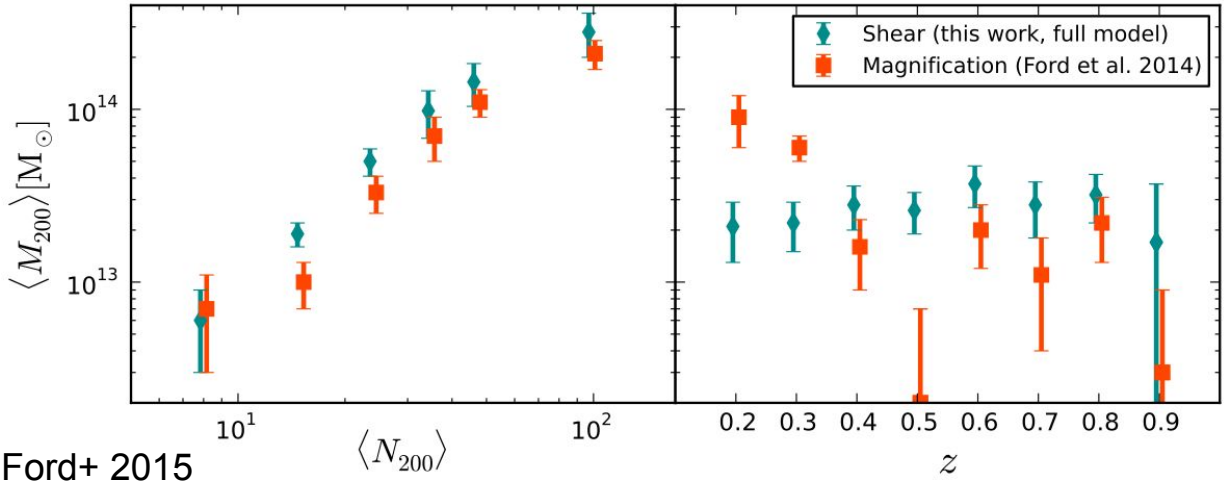
- **Shear:** ~10 million galaxies with shape measurements by CFHTLenS, $z \lesssim 1.2$

  (Ford+ 2015)

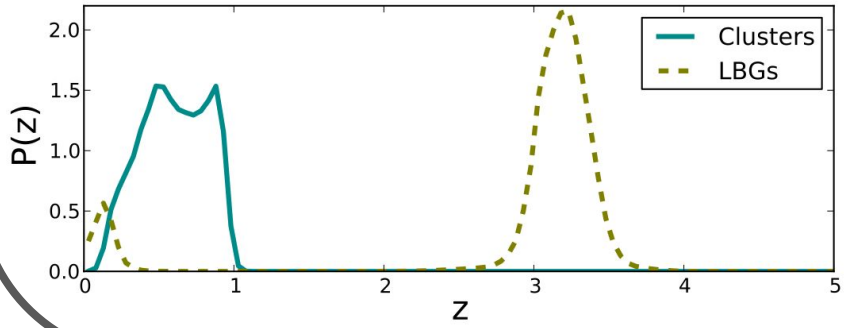
Magnification vs. Shear

Richness Trends

- slopes consistent
- normalization is off by ~2σ



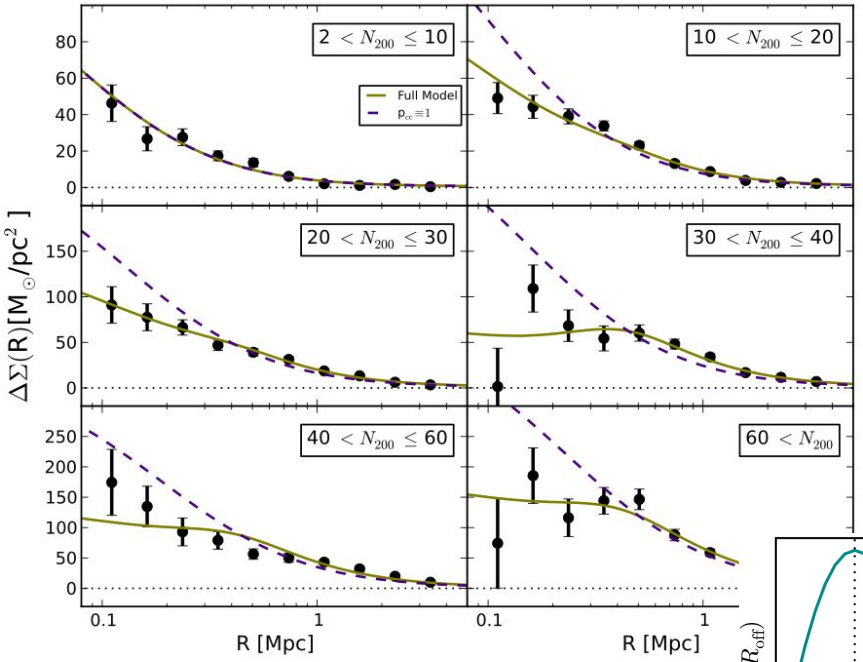
Ford+ 2014, Ford+ 2015



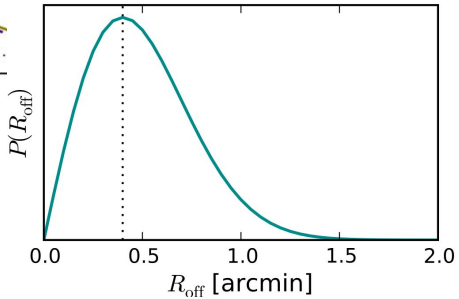
Redshift Trends

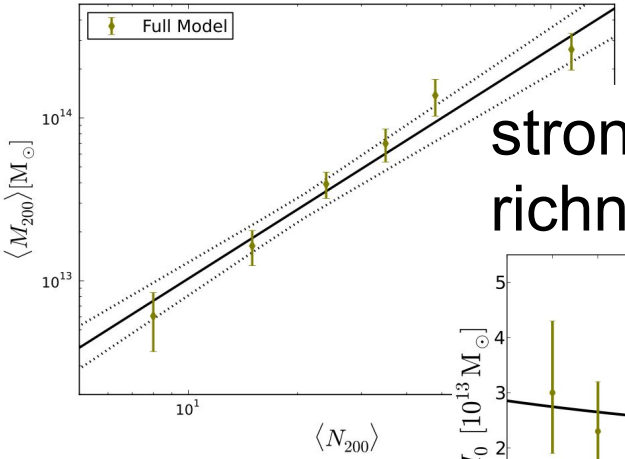
- magnification masses fluctuate
- *Explanation?* contamination of LBGs with low-z galaxies could mimic magnification signal

Cluster Science Highlights



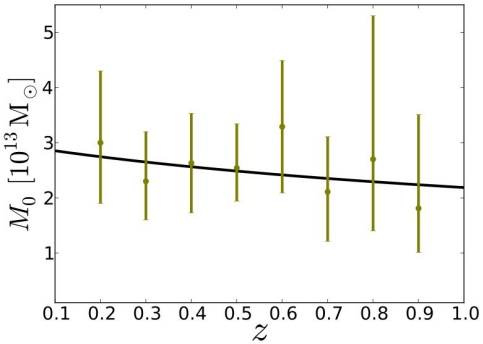
cluster miscentering offsets are important





Ford+ 2015

strong mass-richness scaling



z-evolution of mass-richness relation is not significant

Code & Data

`cfhtlens.org`
cluster catalog & shear catalog are public

`github.com/jesford/cofm`
mass-concentration relations

`cluster-lensing`
shear & magnification profiles

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